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How Doctoral Students with Low GRE Scores Succeed: A Grounded Theory Study

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Abstract

Most U.S. graduate schools rely on the Graduate Record Examinations (GRE) to predict readiness for graduate degree programs and differentiate between applicants in verbal and quantitative reasoning, critical thinking, and analytical writing skills. Many times, low GRE scores create a barrier to entry into U.S. graduate programs despite research showing that selecting graduate applicants based solely on academic metric thresholds does not guarantee graduate student performance and many low scorers still attain a graduate degree on time (Miller et al., 2019b; Pacheco et al., 2017; Petersen et al., 2018; Wang et al, 2013). In this study, we used a constructivist grounded theory approach to develop a theory on how low GRE-scoring students managed to succeed in their graduate programs. Participants included 17 low-scoring yet successful doctoral students from seven universities across the U.S. The results show students' self-determination and emotional and financial support and the university's climate contribute to the success of doctoral students with low GRE scores. This study builds a theory that admission review boards and faculty members can use when weighing standardized testing admission requirements.

Keywords

GRE, doctoral students, admissions, student performance, constructivist grounded theory

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How Doctoral Students with Low GRE Scores Succeed: A Grounded Theory Study

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Most U.S. graduate schools rely on the Graduate Record Examinations (GRE) to predict readiness for graduate degree programs and differentiate between applicants in verbal and quantitative reasoning, critical thinking, and analytical writing skills. Many times, low GRE scores create a barrier to entry into U.S. graduate programs despite research showing that selecting graduate applicants based solely on academic metric thresholds does not guarantee graduate student performance and many low scorers still attain a graduate degree on time (Miller et al., 2019b; Pacheco et al., 2017; Petersen et al., 2018; Wang et al, 2013). In this study, we used a constructivist grounded theory approach to develop a theory on how low GRE-scoring students managed to succeed in their graduate programs. Participants included 17 low-scoring yet successful doctoral students from seven universities across the U.S. The results show students' self-determination and emotional and financial support and the university's climate contribute to the success of doctoral students with low GRE scores. This study builds a theory that admission review boards and faculty members can use when weighing standardized testing admission requirements.

Keywords: GRE, doctoral students, admissions, student performance, constructivist grounded theory

Educational systems around the world use standardized tests as one of the main tools for evaluating students' academic potential, performance, and success. Prior to the COVID-19 global pandemic, many U.S. graduate schools relied on the Graduate Record Examinations (GRE) as a measure to assess verbal reasoning, quantitative reasoning, and analytical writing to predict the likelihood of an applicant's academic success (Educational Testing Service – ETS, 2021). For many graduate admission review boards (ARB), the higher the GRE score, the more likely a student would be admitted to the university of their choice (Posselt, 2014). During the global pandemic, many universities relaxed or waived the GRE requirement (Gothberg, 2021). For example, in 2020, the public health GRE waiver list contained 1,201 entries from 150 CEPH programs representing about 75% of all U.S. programs (Millar, 2020). In their survey of 992 U.S. college students representing all programs and states, Ober et al. (2021) found that “post-baccalaureate programs waived certain exam requirements... including the GRE” (p. 22). Our current study is timely, as universities are currently making decisions on whether to reinstate GRE requirements (Manya Group, 2022; Nietzel, 2022; Woo et al., 2020; Wren, 2022).

As an international student from Kosovo, I, the first author, scored lower than the threshold on the GRE examination but was still admitted into one of the top-three ranked U.S. programs for my field. Here I met the second author, a first-generation female indigenous professor. Native American/Alaskan Natives make up less than 1% of full-time professors in the U.S. (National Center for Education Statistics – NCES, 2018). Thus, we both gained entry

and were highly successful in a top institution and program where the faculty and students were predominately White and achieved high test scores. Our research interests aligned with studying how students labeled as “less likely to succeed” overcame their designation and successfully complete their program.

Historically, a low GRE ranged in importance across different institutions. Many universities decentralized admissions and GRE requirements can vary within and between similar programs (Kent & McCarthy, 2016; Orfield, 2014). In addition, graduate programs weigh components of the test differently, even though they do not state it explicitly (Michel et al., 2019; Orfield, 2014; Posselt, 2016) shared that no literature looks into how different components of the GRE are considered during admission decisions, nor is there a set number or definition of what is considered a low GRE score. Thus, determinations of a low GRE score are rather subjective, as institutions, programs, and majors have different cut scores, but a score lower than the mean score required by graduate school programs can be considered a low GRE score.

According to ETS (2022), the GRE test takers between July 2018 and June 2021 averaged the 43rd percentile in verbal reasoning, the 47th percentile in quantitative reasoning, and the 37th percentile in analytical writing. Graduate school applicants strive to score around these average percentiles or risk low performer status.

Graduate schools expect the submission of the GRE scores along with personal statements, academic records, recommendation letters, and other supporting materials. These requirements assist in identifying students who seem best prepared for the challenges of graduate school. Some researchers believe that the GRE helps predict students’ potential performance (Colarelli et al., 2012) and the amount of time to degree attainment (Schwager et al., 2015). Other researchers found that a low score is often a predictor of low academic aptitude (Johnson-Motoyama et al., 2014).

GRE as a Predictor of Student Success

While the predictive validity of the GRE remains in question, a student with a high GPA and high GRE score will likely receive offers to numerous graduate schools (Colarelli et al., 2012). Standardized tests like the GRE are often seen as better predictors of student success in graduate school than their undergraduate GPA (Kuncel et al., 2010). Supporting this argument, Wao and Onwuegbuzie (2011) found a positive correlation between doctoral students’ time to degree attainment, their GPA, and the GRE quantitative scores. Jones et al. (2019) argued that both undergraduate GPA and GRE scores are useful predictors of doctoral students’ success and persistence. ARBs see the GRE scores as a criterion that ensures unbiased decision-making about the applicant’s potential for degree attainment (Bleske-Rechek & Browne, 2014). While the review boards focus on such standardized tests, we were interested in learning what other factors influence applicants’ potential beyond what is captured by their GRE score.

There is also a contrasting body of research showing that the GRE does not consistently predict students’ progress in graduate programs or the quality of their research (Moneta-Koehler et al., 2017), sharing that ARBs should not rely solely on the GRE scores when making their admission decisions (Hall et al., 2017). For example, Hall et al. (2017) looked at 280 graduate students in their program and found no correlation between their GRE scores and the number of first-author papers those students published, nor the length of time it took them to complete their degrees. Furthermore, Moneta-Koehler et al. (2017) looked at 495 biomedical doctoral students at Vanderbilt University and found that students with higher GRE received better grades in their first semester of graduate school, but their GRE scores did not predict whether they passed their comprehensive exams or completed the degree, the length of time

they spent in the program, whether they were recipients of any grants, scholarships, or fellowships, or the number of publications they authored.

A study conducted by Sealy et al. (2019) looked at 32 Ph.D. students also in the biomedical sciences, and found no predictive relationship between the GRE and the long-term graduate outcomes of these students, including publications, first-author publications, predoctoral fellowship awards, faculty evaluations, and time to degree. In addition, their career outcomes appeared to be encouraging as many of these students went on to pursue postdocs, tenure track faculty positions, and biotech and entrepreneurship careers. Miller et al (2019a) looked at 24 Ph.D. programs in physics in the US, including 3962 students, and found consistent null results for the validity of GRE-V and GRE-P, whereas a significant relationship of GRE-Q was found with Ph.D. completion among both US students as a group and all students, but this was not applicable for samples of females and males separately.

Another study looked at GRE scores and Ph.D. completion of 1805 US citizen students enrolled in STEM programs in four state flagship institutions (Petersen et al., 2018). The authors found that women who completed STEM Ph.D. degrees and those who left the programs had very similar GRE-V and GRE-Q scores. In comparison, men who left the programs had significantly higher GRE scores compared to their counterparts who completed the programs, meaning that men in the lower quartiles of GRE-V and GRE-Q scores were more likely to finish their degrees compared to their peers in the highest quartile. Furthermore, the authors argued that the scores failed to predict the time to degree or flag the students who would drop off their programs during their first year. This pattern held across the four institutions.

On another note, Cassady and Johnson (2002) emphasized that although standardized tests like the GRE measure different aspects of students' academic ability, the scores themselves do not consider the students' mental and emotional states while taking the test, as well as their lived experiences. Moreover, selection decisions play a major role in education opportunities, occupation, and ultimately, the quality of life, and research shows that the role of standardized tests in selection is a source of controversy (Zwick, 2019). In addition to validity and reliability, the Standards for Educational and Psychological Testing now require the addition of fairness (America Educational Research Association, 2018). Since that time, researchers and practitioners question the fairness of the GRE by looking at equality, test equity, and performance equity. The difference between the three is that equality is an equal probability of being accepted in each group, test equity is an equal probability of being accepted in each group, given one's test score, and performance equity is an equal probability of being accepted given one's performance if accepted (Burgoyne et al., 2021; Newman et al., 2022). The GRE is under scrutiny, with some researchers implicating the test as potentially "being rooted in centuries of systemic racism" (Newman et al., 2022, p. 43).

Study Objectives

Although researchers identified several factors that contribute to students' overall success in graduate school (Duranczyk et al., 2015; Gilmore et al., 2016; Madhlangobe et al., 2014), the existing literature does not differentiate graduate students by GRE performance. Understanding the success of graduate students with low GRE scores can inform universities on how to support these students' needs. Furthermore, studies overwhelmingly focus on the quantitative predictive validity of GRE scores for students' performances in graduate school (e.g., Kuncel et al., 2010; Rockinson-Szapkiw et al., 2014; Schwager et al., 2015). Further, the research focused on students who performed poorly on the GRE test but managed to succeed and thrive in graduate school is needed.

Our study helps build a theory on how graduate students with low GRE scores successfully navigate their graduate education journey and stay on track to receive their

doctoral degree. The intended audience for this work is university admission decision-makers. It builds a theory to assist in understanding the structures and supports needed for prospective and current students with low GRE scores to prosper and succeed in graduate school.

The overall research question that guided our study was: how do doctoral students with low GRE scores manage to succeed in graduate school?

Methods

Research Design Overview

When determining the research methodology for this study, we considered its philosophical origins and unique characteristics (Rieger, 2019). We determined that the grounded theory (GT) was best for answering our research question due to its *substantive* theory development that deals with situations and issues people face daily (Birks & Mills, 2015; Bryant & Charmaz, 2007; Kearney, 1998). GT is “an innovative research methodology, consisting of three prevailing traditions: Classic, Straussian, and Constructivist GT” (Kenny & Fourie, 2015), and although the approaches have similarities, they differ in philosophical assumptions that influence how their methods are understood and implemented. (Rieger, 2019). For this study, we took a constructivist GT approach. The constructivist paradigm assumes that reality cannot be objectively discovered, but instead, people, including researchers, construct the realities in which they participate (Bryant & Charmaz, 2007; p. 607).

Researchers using this method build their theories inductively, starting with data from the field, collecting first-hand stories, lived experiences, and insights of people who experience something the researcher wants to understand (Strauss & Corbin, 1998). GT research is conducted through a simultaneous data collection and data comparison technique; researchers interview a participant, analyze the data, identify the emerging trends, and go on to interview the next participant (Charmaz, 2014; Strauss & Corbin, 1998). This process is repeated until researchers reach saturation when additional data won't generate new, useful knowledge for the study (Charmaz, 2006; Corbin & Strauss, 2015).

While most of the research concerning standardized tests is quantitative this study used the constructivist grounded theory (CGT) approach (Charmaz, 2006). CGT methodology is appropriate for our study since it is germane to the development of theory for social interactions and complex relationships between humans, thus setting it apart from other qualitative research approaches (Holton, 2008). Researchers using CGT closely observe patterns of behavior and *social* processes in *social* interactions within the *social* context (Charmaz, 2006). The aim is to construct a theory from the data by recognizing that we are part of the world we study, the data we collect, and the analyses we produce (Charmaz, 2014). Seminally, Glaser (1978) set the stage for GT by opposing the use of any theoretical or philosophical framework prior to conducting a GT study, to avoid preconceived knowledge when entering the field and allow the researchers to maintain an inductive approach. While we understand his rationale and the importance of not engaging in a literature review before conducting a grounded theory study, it is equally important to point out that we conceived this study by first noticing the gap in the literature and recognizing the need to conduct it. Further, citing both Dey (1999) and Layder (1998), Charmaz (2006) points out that it is naïve to view any researcher as a “tabula rasa.” According to her, reviewing the literature but not going too in-depth provides researchers with initial ideas to pursue and particular questions to ask.

Charmaz (2006) argues that a constructivist approach places the phenomena of study at the forefront of the research process by considering the process of data collection and data analysis as a shared experience with participants. She considers researchers part of the research

situation in the sense that their positions, privileges, perspectives, and interactions affect their research. Approaching this study from a constructivist perspective allowed me to freely express my researcher positionality at the beginning of each interview, engage with our participants' stories and experiences by acknowledging them, and sharing my experiences as well, to ultimately better understand what makes them succeed in their doctoral programs, and the extent to which I can relate their factors to those of my own as a fellow doctoral student.

After receiving approval from the Institutional Review Board (IRB, #20-05-01) at Western Michigan University, I collected all of the data discussed below exclusively through one-on-one interviews. After each interview, I looked for the emerging patterns, wrote a memo, and went back to the previous interviews to code and compare them and determine whether similar patterns were emerging, which ultimately led to the theory building.

Once I finished conducting this process, the second author received the recorded interviews along with their transcripts. She decided to only read the transcripts of the interviews, and code the data based on them. Upon completion of the data analysis, she listened to the interview audio recordings to ensure that she was able to capture the context of the conversation correctly.

Researcher Positionality

I entered this study with a great sense of familiarity with the topic based on my experience as a doctoral student who had low GRE scores. I found that the research explored the success factors of doctoral students but did not focus on those with low GRE scores. I conducted a brief literature review on the phenomenon and was surprised to not find anything related to the topic. I recognized the extent of my subjectivity toward the topic, so I practiced reflexivity by going into the interviews with an open mind, specifically bracketing for the factors which supported my success but may not have for her participants. For example, I would ask our participants a question and they would start going in one direction, and if that direction did not align with my personal experience, I was very careful to listen to their stories and not steer them toward discussing experiences that were aligned with mine.

As an indigenous Ph.D. professor and first-generation high school graduate, the second author had a keen interest in the study. She assisted me through the research design and HSIRB process. Her strong belief in a person's ability to overcome obstacles had the potential to influence the study. Also, as a professor in higher education, she was in a position of power compared to the participants for this study. Because of this, she did not attend the interviews so as not to influence the participants in any way. Instead, she waited until the interviews were de-identified and transcribed before assisting with data analysis. In this way, the participants who self-identified as graduate students with low GRE scores were unknown to her.

Participants

For this study, 18 participants were interviewed. We dropped one participant's data due to their pursuing a Psy.D. rather than a Ph.D. (there are major differences in the program format). We gave the participants pseudonyms. Participants were American-born, ranging in age, gender, university, and academic program (see Table 1). While we did not approach this study focusing on our participants' demographic backgrounds in understanding their impact on low GRE scores and their later success, we chose to include such information to provide some context of who our participants were: what were their setting, background, etc? All of the information in Table 1 was self-disclosed from our participants during the interviews by answering direct questions concerning their identities. As per our selection criteria, they were doctoral students from universities across the United States and had completed at least five

semesters' worth of coursework on their program. Half of our participants were on the line whereas the other half fell below the GRE score threshold in at least one of the content areas (below the 47th percentile in verbal reasoning, 50th percentile in quantitative reasoning, and 41st percentile in analytical writing). We set this threshold based on the mean score of all the GRE test-takers between July 1, 2014, and June 30, 2017, published by ETS in 2018, as it was the latest report available at the time when this study took place. We noticed that participants who were both on the line and below the threshold considered their scores low when compared to either the scores of their peers disclosed to them in personal communications or their university's set thresholds. In our study, the GRE scores were self-disclosed by our participants.

Table 1
Demographics for Participants

ID	Age	Gender	Race	University	Program of Study
Amanda	32	Female	White	Midwest	Sports Management
Andy	34	Male	White	Midwest	Interdisciplinary Ph.D.
Dianne	31	Female	White	East	Instructional Technology and Leadership
Erica	33	Female	White	East	Global Inclusion and Social Development
Jessica	40	Female	White	South	Social Work
Jordan	31	Male	White	East	Higher and Postsecondary Education
Katherine	27	Female	White	Midwest	Evaluation
Laura	23	Female	White	East	Social, Cultural, and Behavioral Sciences
Lydia	40	Female	Hispanic	Midwest	Organizational Analysis
Marcella	31	Female	Black	South	Nutrition
Nancy	57	Female	White	Midwest	Organizational Analysis
Norah	26	Female	Black	Midwest	Sociology
Ryan	33	Male	White	Midwest	Counseling Psychology
Susan	31	Female	White	East	Communication Sciences and Disorders
Thomas	59	Male	White	Midwest	Public Administration
Valerie	59	Female	White	Midwest	Organizational Analysis

Wesley 35 Male White Midwest Public Administration

Participant Selection and Recruitment

We used a purposive sampling method to find and recruit participants. As a first step, we sent email invitations to doctoral students at my university and then used social media platforms, including Facebook and Instagram, to reach students across the U.S. We contacted the administrator of the page, *The Dissertation Coach*, which has a high number of followers in both platforms (292,000 and 119,000, respectively). When participants expressed interest in participation and we confirmed their eligibility, we sent the consent form and asked them to sign it if they agreed to participate in our study. Once we received the signed consent form, we scheduled the interviews. We offered no incentive or compensation to participants.

For GT studies, Charmaz (2006) and Creswell (2018) suggest that the number of participants needed to reach saturation may be between 20 and 30. However, Charmaz (2006) shared that the aims of the study are the ultimate driver of the sample, suggesting that a small study with “modest claims” (p. 114) might achieve saturation more quickly than a study that is aiming to describe a process that spans disciplines. Because the scope of our study was small and our inclusion criteria tight, we began to see patterns of data saturation after conducting twelve interviews, as the success factors that our participants were mentioning became repetitive and overlapped from one interview to the other. When the second author and I (the first author) met to discuss the possibility of saturation, we were incredulous that it could occur after only twelve interviews and agreed that there were clear overlaps between interviews. For example, we noticed the majority of categories that became part of our theory after those interviews. Nevertheless, we decided we should conduct more interviews to ensure we detailed the context of the experience in full. By the 18th interview, “nothing new was coming out of the data” (Green & Thorogood, 2018, p. 120), so we were confident that we reached data saturation and concluded the data collection process.

Data Collection

Immediately after beginning data collection, the COVID-19 global pandemic began. Three interviews were conducted face-to-face before we had to shift to a virtual setting per the Center for Disease Control and Human Subjects Institutional Review Board (HSIRB) requirements. I (the first author) conducted the remaining interviews virtually using the videoconferencing software WebEx platform with participant videos on. We treated the interviews equally, whether they were conducted in-person or virtually. A few studies found differences in data collection venues suggesting that data collected in person can differ from videoconferencing. Most notably, in their empirical study, Gothberg et al. (2013) found statistically significant differences in the disclosure of sensitive information with the virtual venue encouraging increased trust and disclosure (also see Janghorban et al., 2014). In our experience, however, we were not able to notice any significant differences between our three in-person interviews and those conducted virtually. Due to the topic of our research, our interviewees felt heard and recognized, as they shared the same “stigma” around their low GRE scores, and after disclosing my (the first author’s) low GRE scores as well, it was easier to build trust. We used the constant comparison method where we conducted the interviews in order and performed and analyzed each interview before moving to the next interview. We compared the interviews at the critical juncture between the final face-to-face interview and the first virtual interview and did not observe any noticeable differences that could be attributed to the change in venue. The semi-structured, open-ended interview protocol remained consistent across the venues.

The individual interviews ranged in length from 33 to 77 minutes, with the average interview being 55 minutes long. Once we started detecting some of the most common themes across the first few interviews, the interviewer included indirect questions related to them to confirm whether they were applicable to other participants. We interviewed each participant only once. The participants showed emotions and feelings to a degree that can be considered intensive, such as crying or anger while telling their story, and in-depth conversations showed trust was built between the interviewer and the participants. However, we had anticipated that such feelings might be expressed and had disclosed this as a potential risk in our IRB application. We reminded our participants that they could stop the interview anytime if they did not feel like they could continue to talk and share. After each interview, to confirm our understanding of participants' experiences and our interpretations, we conducted member-checking by sharing our interview memos with our participants and requesting their feedback. We also kept a log trail marking every development and decision throughout our study.

Analysis

Data Analytic Strategies

According to Charmaz, "coding is the pivotal link between collecting data and developing an emergent theory to explain these data" (2006, p. 46). Using her coding approach, we engaged in three phases: initial coding, focused coding, and theoretical coding. For the initial coding, we first read each transcript line-by-line and assigned preliminary codes to each sentence as a corrective measure to avoid any preconceived ideas by focusing on individual sentences. We used in-vivo codes to "preserve participants' meanings of their views and actions in the coding itself" (Charmaz, 2006, p. 55). We repeated this process for every interview before moving to the next one. In this initial coding stage, we kept our minds open to any potential directions that our data might take. Secondly, we started focusing our reading by sorting our labeled codes, merging those that were similar, and organizing our data. Here, we started seeing the most repetitive codes that we decided to retain, and then dropped some initial codes that were not present in the later interviews. This stage left us with a smaller pool of codes from what we had noted initially, which we then grouped into categories based on their similarities. Because the second author had not participated in the live interviews, she immersed herself in the transcript data, first reading each interview as it was given to her and then re-reading the same interview transcript to begin the constant comparison coding. We conducted our constant comparison analysis independently for the data corpus by comparing every new interview with the previous interviews in the search for commonalities and then met to discuss our results. From our initial coding, we agreed on over 90% of the codes, giving us a high level of intercoder agreement. For the areas we coded differently, we discussed the differences and came to a consensus. Finally, together, we conducted theoretical coding (Charmaz, 2014; Glaser, 1978), where we grouped the codes based on their frequency and relevance to one another, asking ourselves about each of those codes we decided to retain, such as: why is this category important? How is this category similar to this other category that used a similar expression? What is the possible relationship between these two categories? As we continued with theoretical coding, we wrote another analytic memo, which is crucial for this stage of coding (Charmaz, 2006) to explain why grouping codes into specific categories made sense.

After this entire process, we created four coding categories which we believed accurately depicted what we saw from our data. After analyzing the categories which represented a relationship between initial codes, we ultimately decided to group them into two major themes. Once we had all of the categories ready, based on what we saw, it made sense

to classify some of the factors into intrinsic and some others into extrinsic, thus allowing us to create these two major themes.

Methodological Integrity, Consistency, and Trustworthiness

We asked our participants a set of diverse questions that allowed us to best capture and understand their doctoral experiences. We did not provide the participants with the questions prior to the interview.

To support the findings presented in the next section, we share direct quotes from the interviews. As per Charmaz's (2006) suggestion, throughout the data collection process, I wrote interview memos telling our participants' stories in my own words, which I then member-checked with the participants to confirm the accuracy of the interpretation and thus the credibility of our study.

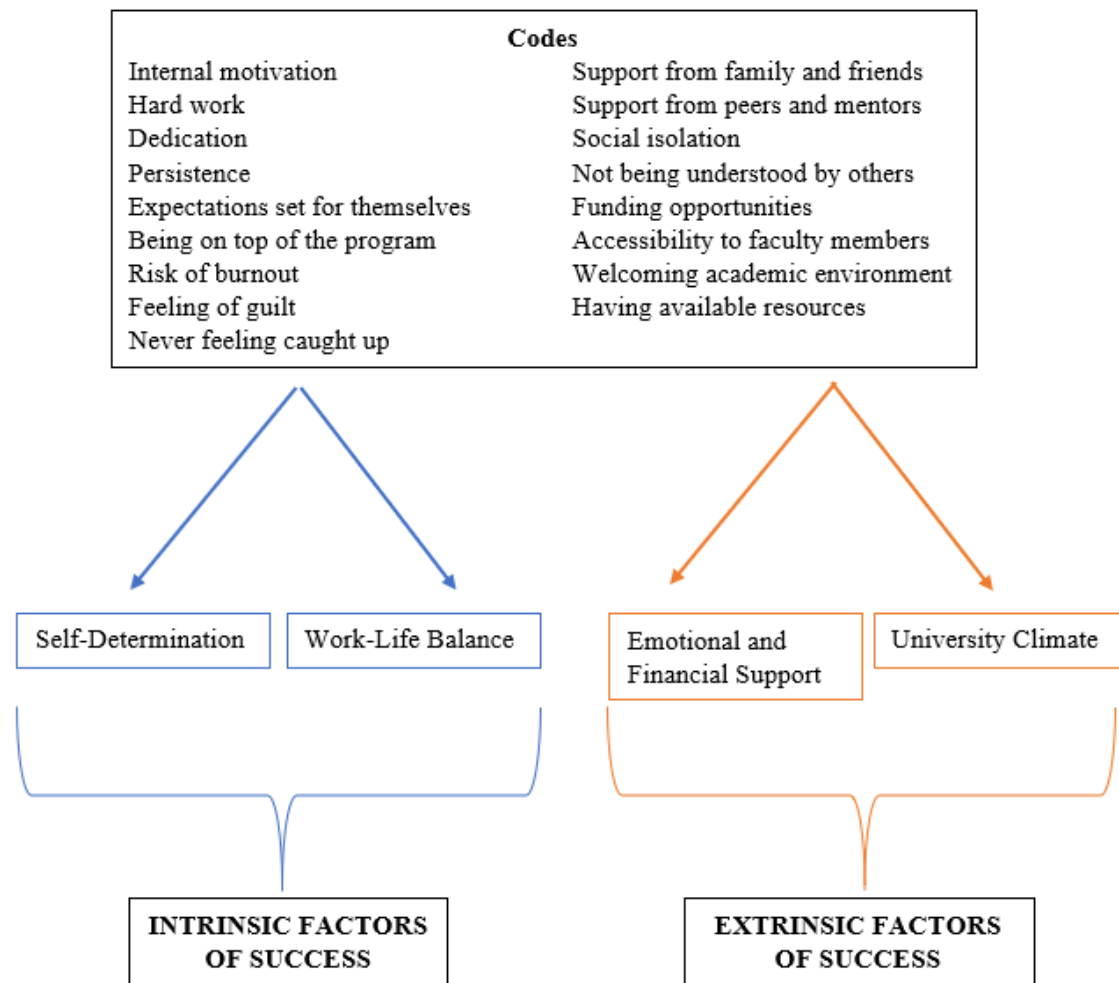
To bracket ourselves, or in other words, mitigate the effects of unacknowledged preconceptions related to the research and increase the rigor of the project (Tufford & Newman, 2012, p. 81), I initially reflected and wrote down my own success factors in a memo, and once I had collected the data, I started analyzing what the study participants had identified. Before I entered the interview phase, I had already identified my preconceptions regarding the topic to learn more and acknowledge my personal assumptions. After identifying the themes, I went back to compare my perspective with my participants' perspectives, thus keeping myself accountable and open to additional perspectives. As Tufford and Newman (2012) noted, "Memoing one's hunches and presuppositions, rather than attempting to stifle them in the name of objectivity or immersion, may free the researcher to engage more extensively with the raw data" (p. 86). I found this with my process, given my background and experience with the GRE. The study demonstrates consistency by precisely following the CGT approach to coding, as well as confirming the accuracy of the interview transcripts and memos with the study participants. To ensure a high rigor for our qualitative study, we engaged in several initiatives, such as member checking, thick descriptions through providing direct quotes from our participants, as well as their demographic information in Table 1 above, and finally, the researcher's reflexivity.

Results

Two major themes emerged from the data analysis process that aligned with our research questions: (1) intrinsic factors, and (2) extrinsic factors. The first theme encompassed categories such as students' self-determination and struggles with school-life balance. While some of the factors that fall in this bucket might be perceived as obstacles or challenges based on how our participants expressed those factors, we perceived them as the main drivers that push this group of students further towards reaching their goals. The second theme included students' needs for emotional and financial support and a healthy university climate. The extrinsic factors are mainly characterized as the help and resources that students receive from their outside environment, such as from the university or the communities they belong to, the peer connections they establish during the program, and the assistantships and fellowships they receive. The themes and categories mentioned led us to create a theory on the factors of success of doctoral students with low GRE scores (see Figure 1).

Figure 1

Theory Construction of the Success Factors of Doctoral Students with Low GRE Scores



Intrinsic Factors

Self-Determination

The first category that derived from our codes was *self-determination*. The statements that our participants made about their internal motivation, hard work, dedication, level of competence, persistence, and expectations set for themselves all landed in this shared category. While these individual codes might come across as similar, we considered it important to discuss each and all of them under the umbrella of self-determination. Once we had solidified this code, we consulted the literature which defined the concept as “Acting with a sense of choice, volition, and commitment” (Deci & Ryan, 2010). A common belief that our participants shared was that the GRE did not define them as graduate school applicants, as students, or as professionals. According to some of the students, the GRE was not a self-fulfilling prophecy, as it did not keep them from succeeding in their graduate programs. Despite receiving low scores, Jordan said:

I did have the confidence to know that I could go to grad school and be successful and I could write, and I could be open-minded to other ideas and that’s what I felt like I needed for graduate school.

Similarly, Erica pointed out:

Just going back to looking at how these low GRE scores impact your success as a student, I just don't think a standardized test is an accurate measure of somebody's ability to learn or convey knowledge.

Our interviews showed that the mindset of doctoral students is shaped by their inner attributes such as persistence. In Nancy's words:

I'm someone who likes to finish what I start. I refuse to quit, I refuse to quit, otherwise, I would have already quit. So, because I've been through the hard stuff already, I've been through some horrible semesters, and I think, persistence, I think persistence is more important than the brain.

When asked about the reasons for her success, Jessica also mentioned dedication:

I really feel like part of my success has been my dedication, which sounds kind of full of myself but I was very dedicated to things, like doing all the readings and making sure I was doing all the assignments and not getting behind. I really was dedicated to hard work.

The interviews showed that most of these students had average to high expectations for themselves in terms of how they were going to perform on the GRE. Many of them already recognized their strengths and their weaknesses, so they were able to gauge their performance in each of the sections of the GRE. To some of the students' surprise, their scores did not line up with their expectations, thus disappointing them and causing some bitter feelings toward the test. As a disappointed Susan mentioned, "I don't think I knew I was going to do as poorly as I did." Explaining to us how his writing scores did not align with his expectations, Jordan said:

I'm a good reader, and I think I'm a pretty good writer, but I think when I have a little clock in the corner ticking down, and I don't have as much time as I need to complete it, I think that's probably why I rush, and oh my gosh, I'm stressed and I need to get this done.

It is worth mentioning that the participants' expectations for themselves stretched even beyond the test and into their graduate programs. Getting admitted into a doctoral program made our participants cognizant of the high expectations regarding their performance set by their faculty, family, and friends. Therefore, our participants set as high, if not higher expectations for themselves, despite the sacrifices they had to make and the challenges they faced. Lydia said:

When you reach this level of education, you're expected to be highly intelligent and that takes several classes actually before I started being very inquisitive because they just know I can do it and I have to show I can do it...I have to just make it happen by any means necessary, even if I'm really droning on the inside and I'm like burning, and the sky is falling around me. That has I think helped me.

School-Life Balance

The second category we develop was the *school-life balance*. This was a topic that came up in every single interview, and the participants had a lot to say about it. They made it clear that, for them, the doctoral degree is a laborious yet temporary endeavor, which means having to put their personal lives on hold to complete the degree. The participants acknowledged the need to work as hard as they can to be on top of their programs, even if it means sacrificing the balance in their lives. The participants mentioned that they never fully felt like they were caught up, which led to them feeling guilty for engaging in activities outside their program. When asked about the balance, Marcella said:

It's definitely something that I've struggled with my entire program because I feel like I just, you know how you feel guilty when you dedicate time to something else, it's like: No, I should be writing right now or I should be doing something on my to-do list. I've gotten better over the years, but I think it's still a challenge because you just want to get everything done, and you don't ever want to feel like you're wasting time.

While most of them risk experiencing burnout due to high levels of stress and commitment towards their degree, it seemed that the further the participants were in their program, the better they managed to balance their lives, check in with themselves, and fit other activities in their daily schedules. As Laura put it:

I think that having a good balance is just what ultimately helps you be productive and hardworking because if you were doing it all the time you get so burnt out.

Extrinsic Factors

Emotional and Financial Support

On the second theme, both emotional and financial support came up in different codes, which ultimately got solidified into one category. Our participants expressed their clear need for emotional support during their doctoral degrees. For different students, the support came in different shapes and from different sources. Almost every participant, even before mentioning their inner values that contributed to their success, brought up the emotional support they receive from others. Typically, the participants receive emotional support from their families, partners, friends outside academia, cohorts and peers, and supervisors at work. Katherine refers to her support system as a *village*. She says:

I think I've just had a really, really supportive village, whatever that looks like. I think everyone has a village and mine consists of my family members, even though they're further than I would like. I have a fiancé that pushes me and takes care of me, and my peers, I think that's a huge thing and part of our village too; we all know the struggles of every single class and I think we support each other well.

Family support was instrumental for almost every participant in this study. The majority of them were the first in their families to pursue doctoral degrees, and a number of them were first-generation college students. While the families of most of our participants did not understand the type of work our participants did or why they were stressing in pursuit of such a demanding degree, they nevertheless showed their emotional support by being there, taking

care of the participants, and demonstrating feelings of pride. Throughout the interview, Norah continuously emphasized that she wouldn't have been in her program had she not had support from her family. When she got accepted into her doctoral program, Norah recalled how her late father felt about it. She said:

My dad grew up under Jim Crow in the United States so during our legal segregation that was what my dad was living in. I think in many ways, it was something he couldn't believe was happening while he was alive, like the idea of one of his children, not just getting a four-year degree but also pursuing these advanced degrees was something that was a bit shocking to him, but he was very supportive of it.

Given the social isolation of the doctoral students due to their limited time for their personal lives, peer connection was very important for all of them. Interacting with peers, engaging in fruitful discussions concerning their classes, and establishing peer accountability helped this group of students improve their program performance and become more successful. The students feel they have the support they need, and more importantly, they feel like they are being understood by their peers because they are sharing similar experiences. Speaking of the inspiration he gets from his peers, Ryan said:

I think that finding ways to be able to express that to other people and have that helps to relieve that feeling, and to kind of get back some of that motivation, like, okay, I see you, somebody a cohort or two ahead of me, who has been through what I've been through, and you're somewhere else now, you've made it past this, and that brings me a lot of hope and makes me feel like it's something that I can do, and can get through and it's really just about persevering.

Financial support is very important for many of our participants, especially for those who don't have full-time jobs and are dependent on their assistantships, fellowships, or scholarships. While only a few of them were lucky to receive financial support from their families, the rest of them relied on the funding they could get from their universities or external sources. Most of these students made it clear that they did not even consider applying to schools that did not offer doctoral funding.

University Climate

A healthy university climate was a recurring code across our interviews, which ended up as a category. While "healthy" can be a subjective term, for our students, it generally revolves around the idea of having supportive and accessible faculty, developing mentorship relationships with someone in the program, having available resources, and overall being in a welcoming academic environment. Recalling a conversation with one of her professors who helped her throughout the program, Lydia said: "If you could do it all, one professor actually told me, 'if you can do it on your own, why are you in this program?'"

For most of the participants, sharing research interests with the faculty was an important way of connecting with them. They agreed that it is one thing to have professors who are good academics and excellent at their job, and it is another thing altogether to be surrounded by professors who are also "good human beings." Having said this, most of the participants appreciated having professors who check in with them and were truly interested in their students' well-being, or as Nancy put it:

Some of the biggest contributors have been really good instructors, and faculty, who cared, who weren't just good at their jobs, but also were very supportive of me as a student. That's probably one of the biggest factors, if not the biggest factor.

Discussion

In this study, we sought to understand how doctoral students with low GRE scores succeed in a graduate-level program. The results show that not only are these students capable of maintaining high performance, but it is also essential for them to acknowledge their habits and emotions, and nurture relationships that help them feel successful in their programs. These include working hard, setting high expectations for themselves, connecting with their peers and faculty, seeking outside emotional and financial support, and even sacrificing their personal lives, all of which contribute to their ultimate academic success. Our findings will help current and prospective doctoral students in reflecting on their doctoral journey, reassuring them that they are not alone in their daily challenges.

Our literature review showed that standardized tests like the GRE are limited predictors of a student's academic success (Moneta-Koehler et al., 2017) and should not be the main source relied upon by ARBs when making decisions (Hall et al., 2017). By shedding light on the success of our participants who have succeeded in graduate school despite their low scores, our study supports these findings. We reviewed the literature after having developed our theory, and we noticed that several studies argue that the success of graduate students is influenced by factors such as community, faculty support, family support, academic peers, persistence, and individual motivation (Cross, 2014; Hlebec et al., 2011; Jairam & Kahl, 2012; White & Nonnamaker, 2008). Field (2016) pointed out that *self-determination* is influenced by intrinsic characteristics such as knowledge, skills, and beliefs, as well as external obstacles that students typically come across.

Advisor mentoring is considered by many studies as an important factor in doctoral students' success (Bagaka's et al., 2015; Devos et al., 2017; West et al., 2011), which is also in line with our findings. Funding was also identified as a great influencer of doctoral students' success (Spronken-Smith et al., 2018; Zhou & Okahana, 2019). We found that funding often determines the university choices our students made, as they were not inclined to apply to programs that did not offer any funding.

Several studies have found that although doctoral students recognize the problem, they often find it difficult to maintain a healthy work-school-life balance (Martinez et al., 2013; McAlpine et al., 2020). This was an issue widely discussed by our participants. However, seeing this degree as a temporary endeavor was identified as one of their coping mechanisms.

Our findings challenge the studies claiming that low GRE scores are good predictors of low academic performance (Johnson-Motoyama et al., 2014; Kuncel et al., 2010), or that the GRE predicts students' persistence at a doctoral level (Jones et al., 2019). As we have seen, even though our participants had low GRE scores, they maintained high academic performance and demonstrated persistence on their doctoral journey.

Using CGT allowed us to be open-minded to ideas that were presented by our participants. However, after reviewing the literature, we realized that our particular group of students is not that different than their peers in doctoral programs who might have had higher scores, as they faced similar challenges and success factors. In conclusion, rather than relying heavily on GRE scores, taking a more holistic approach will support more students' success and allow them to show what they can accomplish.

Limitations of the Study and Implications for Future Research

This study has some limitations: firstly, the tight inclusion criteria may have deprived us of differing perspectives, secondly, having aggregated data across venues (face-to-face and WebEx) might have yielded different kinds of interviews in terms of the quality of the stories and their depth (Gothberg et al., 2013; Janghorban et al., 2014), and thirdly, potential participants might have hesitated to disclose their GRE scores due to the stigma.

Understanding the experiences and success factors of doctoral students with low GRE scores will enable universities to identify potentially successful students during the application process and better support them in their studies. Our study focused only on U.S. domestic students. An important follow-up study would be to include international students.

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